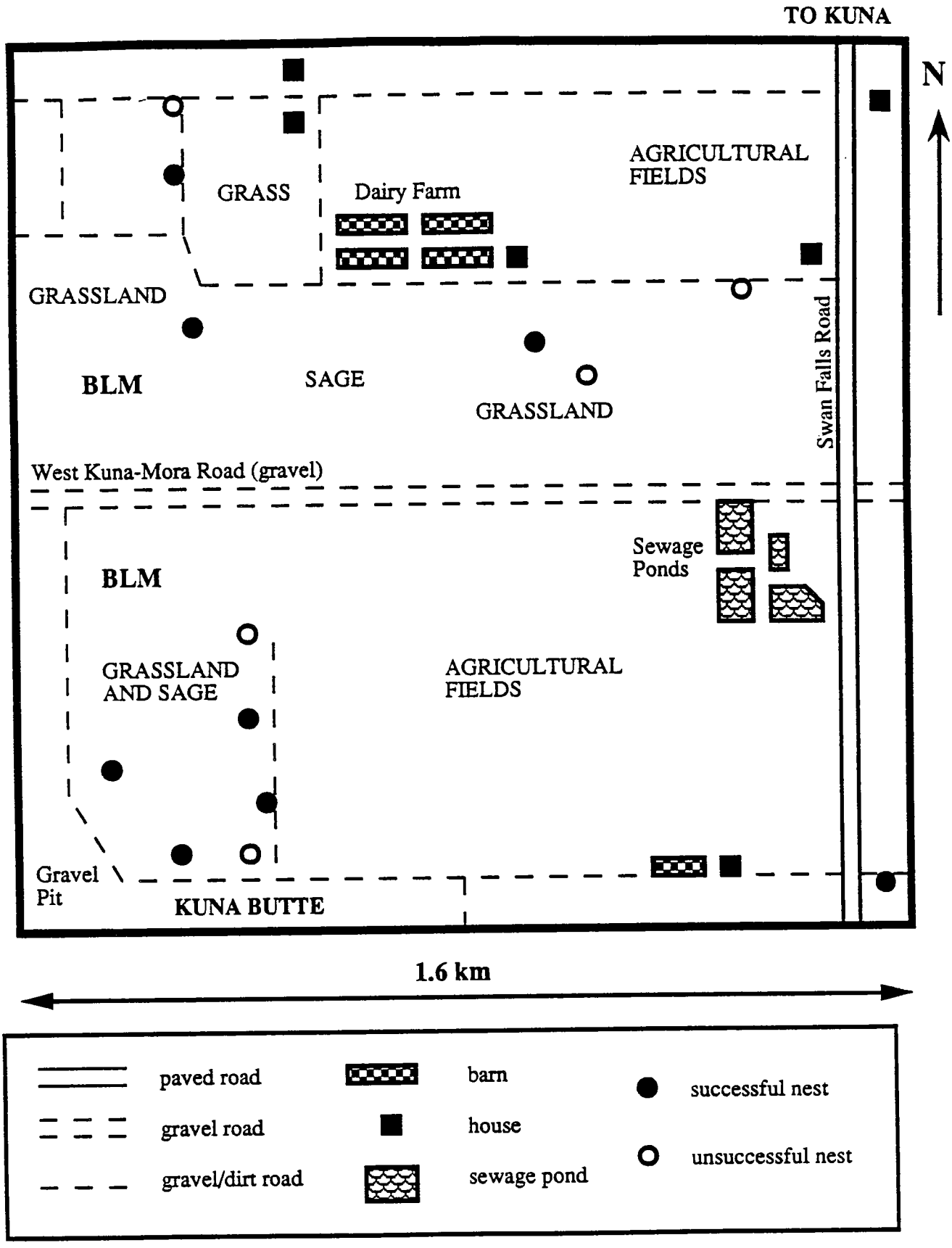


Figure 1. Graphical map of the study area located south of Kuna, Idaho, near Kuna Butte.

a)

b)

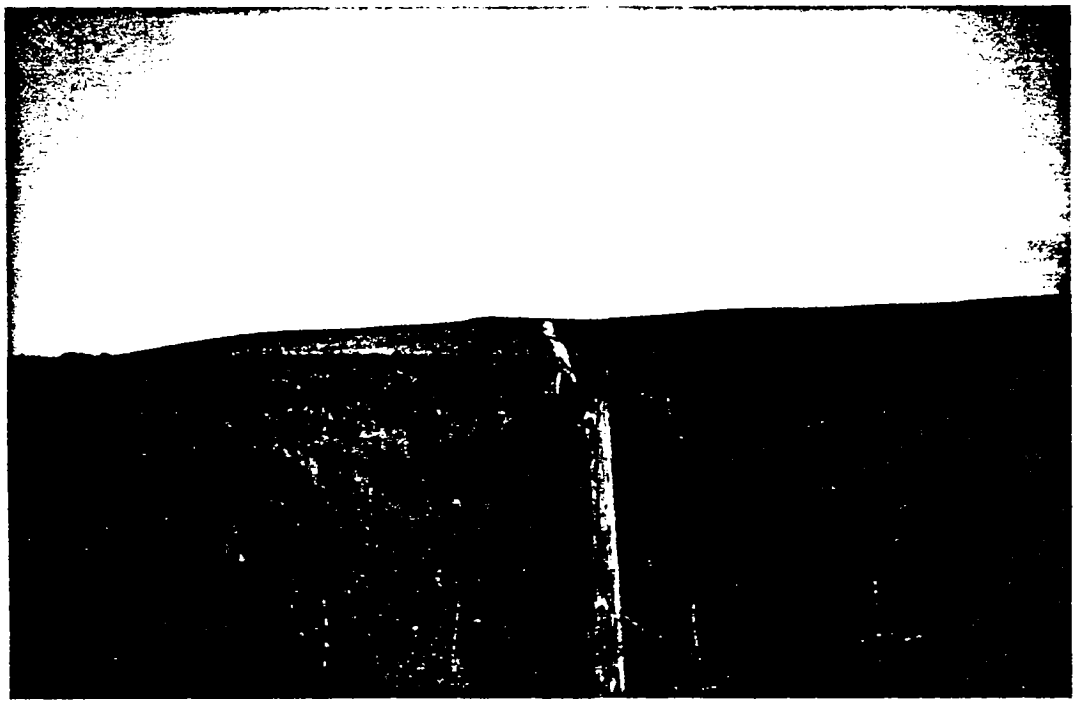

Figure 2. Photographs of the study area near Kuna, Ada County, Idaho. (a) This photo illustrates the open grassland habitats on the area. (b) A burrowing owl perches on a wooden fencepost near dense sagebrush habitat.

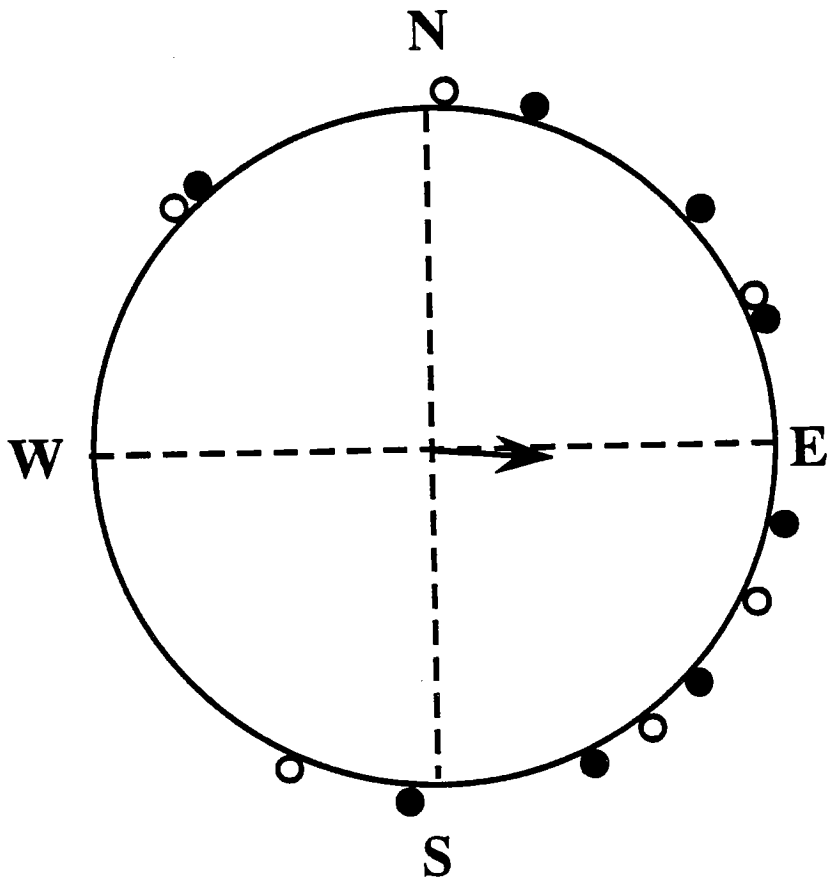


Figure 3. Circular scattergram of orientation of burrow entrances for successful (closed) and unsuccessful (open) burrowing owl nests during 1994. Mean orientation is signified by the arrow, which is 93.9°. The value of r varies from 0 - 1 (see text) and is indicated by the length of the arrow (0.346 in this case).

## BURROWING OWL - BREEDING SEASON CHRONOLOGY

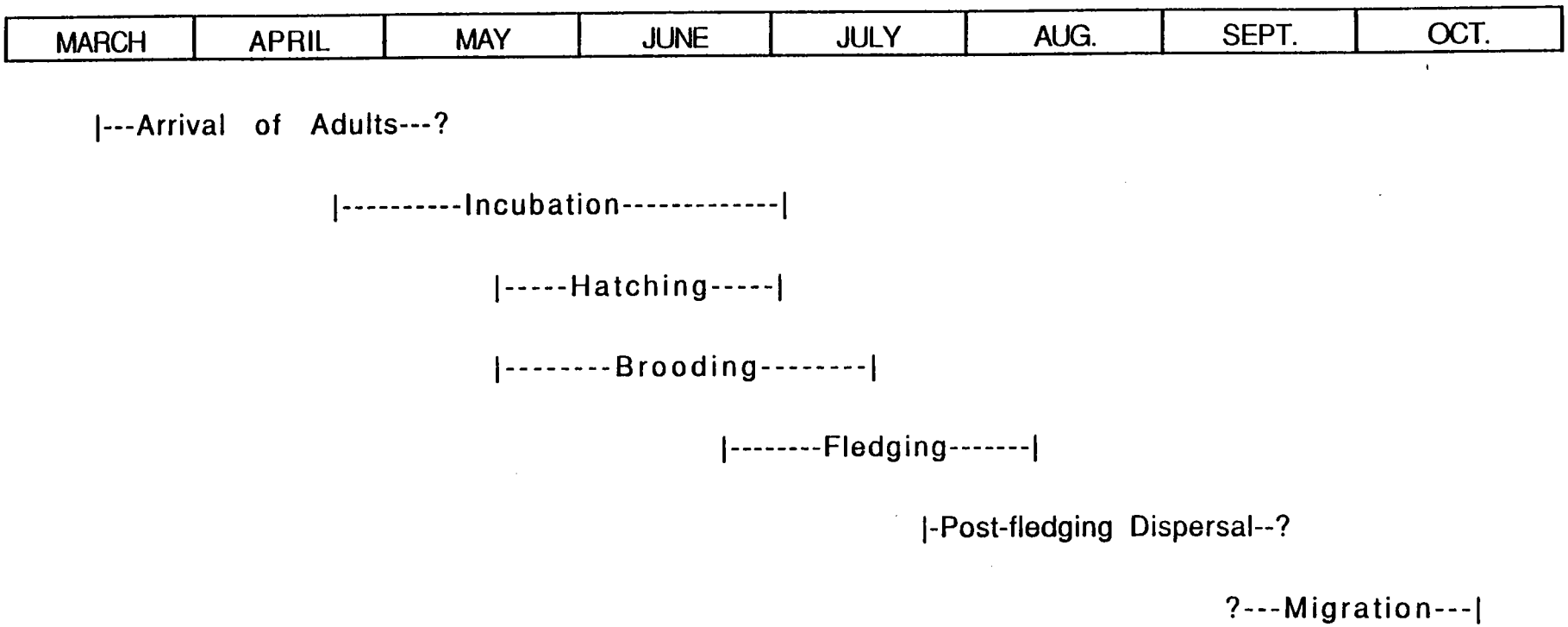


Figure 4. Chronology of events during the breeding season exhibited by burrowing owls in southwestern Idaho. Question marks reflect areas in which the timing of events remain uncertain.

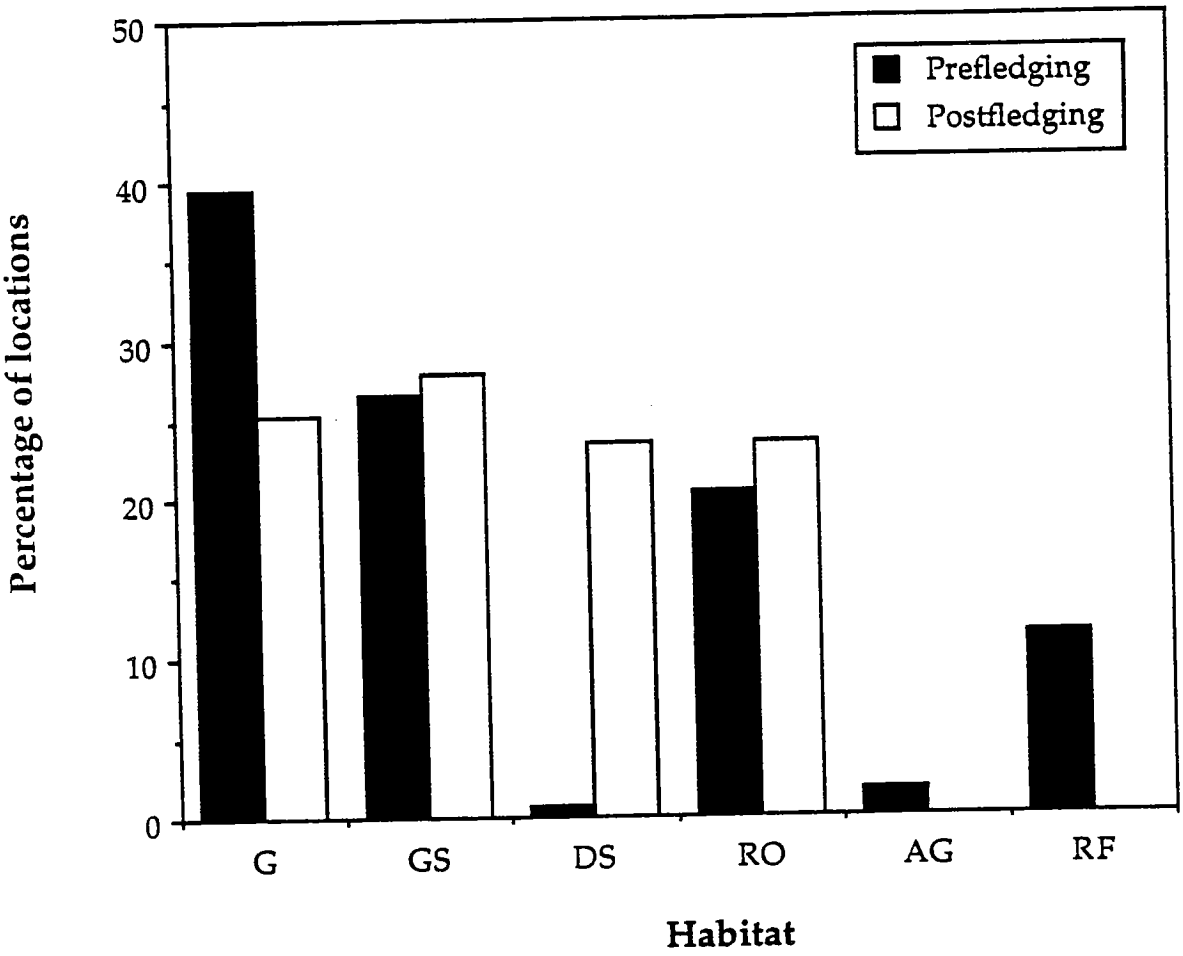


Figure 5. Habitats used by juvenile burrowing owls ($N$ = 15) during the pre-fledging and post-fledging periods in 1994. Graph illustrates the percentage of observations in each habitat type for each period ($N$ = 691 for pre-fledging period, $N$ = 119 for post-fledging period). *Habitats*: G = open grassland; GS = grassland with some sagebrush; DS = dense sagebrush, RO = rock outcrops; AG = agricultural field; RF = roads/fencerows.

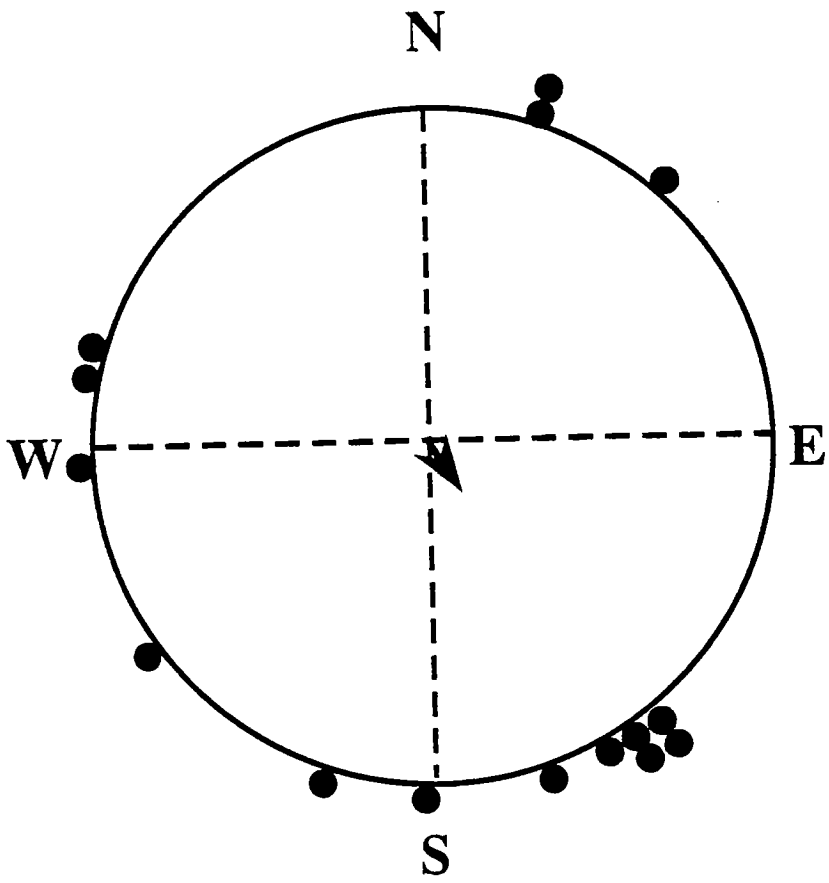


Figure 6. Circular scattergram of dispersal directions for 15 radio-tagged juvenile burrowing owls. Mean orientation is signified by the arrow, which is 153.8°. The value of r varies from 0 - 1 (see text) and is indicated by the length of the arrow (0.145 in this case).

Table 1. Summary of methods and captures of adult and juvenile burrowing owls during the 1994 field season. Totals differ from those in the text because some individuals were captured more than once. *Note:* all capture methods were not employed equally.

| Method of Capture | Adult Female | Adult Male | Juveniles | Total |
|---|---|---|---|---|
| Noose rod | 1 | 3 | 43 | 47 |
| Havahart® live trap | 15 | 1 | 5 | 21 |
| Captured by hand | 0 | 0 | 8 | 8 |
| Bal-chatri | 2 | 4 | 0 | 6 |
| Noose carpet | 0 | 0 | 5 | 5 |
| Hand-made trap | 0 | 0 | 4 | 4 |
| Carrion trap | 0 | 0 | 2 | 2 |
| Noose rock | 0 | 0 | 1 | 1 |
| Sherman® live trap | 0 | 0 | 1 | 1 |
| Tomahawk® live trap | 0 | 0 | 0 | 0 |
| **Total Captures** | 18 | 8 | 69 | 95 |

Table 2. Habitat characteristics at or near burrowing owl nest burrows in southwestern Idaho during 1994.

| Variable | $\bar{x} \pm SE$ | Minimum | Maximum | $N$ |
|---|---|---|---|---|
| Burrow diameter (cm) | 19.3 ± 1.1 | 15.0 | 27.5 | 14 |
| Height of mound (cm) | 10.7 ± 1.5 | 3.0 | 23.0 | 14 |
| Nearest burrow (m) | 14.4 ± 3.4 | 2.4 | 34.0 | 14 |
| Number of burrows within 10 m | 4.4 ± 1.2 | 0 | 13 | 14 |
| Distance to first satellite burrow (m) | 28.9 ± 6.1 | 7.3 | 57.0 | 8 |
| Nearest perch (m) | 13.4 ± 4.3 | 0.8 | 50.0 | 12 |
| Height of perch (cm) | 97.1 ± 12.9 | 25.0 | 150.0 | 12 |
| Nearest agricultural field (m) | 80.5 ± 25.3 | 1.0 | 321.0 | 14 |
| Nearest road (m) | 48.2 ± 12.7 | 0.5 | 163 | 14 |
| Nearest water (m) | 99.9 ± 26.4 | 1.0 | 321.0 | 14 |
| Average ht. of veg. at burrow (cm) | 11.1 ± 1.7 | 0 | 25.0 | 14 |
| Average ht. of veg. within 2 m of burrow (cm) | 21.1 ± 2.5 | 0 | 35.0 | 14 |

Table 3. Pairwise distances (m) between 13 burrowing owl nests examined during the 1994 breeding season. Comparisons with IBP #1 are excluded because this nest was located outside the main study area.

| Location Name | D2 | D3 | D4 | D5 | D6 | KB1 | KB2 | KB3 | KB4 | KB5 | KB6 | SF1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dairy #1 | 491 | 1201 | 1237 | 461 | 1135 | 1545 | 1459 | 1355 | 1221 | 1614 | 1665 | 1238 |
| Dairy #2 | | 749 | 830 | 121 | 652 | 1296 | 1101 | 965 | 788 | 1250 | 1253 | 1338 |
| Dairy #3 | | | 188 | 839 | 228 | 1318 | 1216 | 1045 | 815 | 1306 | 1194 | 1979 |
| Dairy #4 | | | | 935 | 412 | 1503 | 1398 | 1228 | 999 | 1494 | 1372 | 2109 |
| Dairy #5 | | | | | 716 | 1142 | 1047 | 923 | 766 | 1199 | 1221 | 1220 |
| Dairy #6 | | | | | | 1087 | 983 | 814 | 592 | 1084 | 976 | 1784 |
| Kuna Butte #1 | | | | | | | 101 | 274 | 508 | 104 | 305 | 1272 |
| Kuna Butte #2 | | | | | | | | 164 | 398 | 155 | 276 | 1265 |
| Kuna Butte #3 | | | | | | | | | 222 | 290 | 317 | 1314 |
| Kuna Butte #4 | | | | | | | | | | 517 | 472 | 1398 |
| Kuna Butte #5 | | | | | | | | | | | 216 | 1372 |
| Kuna Butte #6 | | | | | | | | | | | | 1550 |
| Swan Falls #1 | | | | | | | | | | | | |

Table 4. Comparison of habitat variables for successful ($N = 8$) and unsuccessful ($N = 6$) burrowing owl nests during 1994 based on univariate analyses using ANOVA.

| Variable | Successful $\bar{x} \pm SE$ | Unsuccessful $\bar{x} \pm SE$ | F value | df | Probability |
|---|---|---|---|---|---|
| Entrance diameter (cm) | 20.0 ± 1.7 | 18.3 ± 1.2 | 0.65 | 1,12 | 0.437 |
| Height of mound (cm) | 10.8 ± 1.7 | 10.6 ± 3.0 | 0.01 | 1,12 | 0.949 |
| Nearest burrow (m) | 15.7 ± 4.8 | 12.6 ± 5.0 | 0.19 | 1,12 | 0.671 |
| Nearest occup. burrow (m) | 237.5 ± 71.5 | 224.6 ± 70.1 | 0.01 | 1,11 | 0.906 |
| No. burrows within 10 m | 4.0 ± 1.5 | 5.6 ± 2.3 | 0.15 | 1,12 | 0.708 |
| Nearest perch (m) | 13.9 ± 6.3 | 12.8 ± 6.2 | 0.01 | 1,10 | 0.912 |
| Height of perch (cm) | 90.1 ± 15.0 | 107.0 ± 24.2 | 0.39 | 1,10 | 0.544 |
| Nearest agricul. field (m) | 100.6 ± 39.5 | 53.8 ± 27.0 | 0.82 | 1,12 | 0.382 |
| Nearest road (m) | 48.0 ± 14.3 | 48.3 ± 24.5 | 0.01 | 1,12 | 0.992 |
| Nearest water (m) | 128.7 ± 40.7 | 61.4 ± 24.9 | 1.67 | 1,12 | 0.221 |
| Veg. height at burrow (cm) | 9.4 ± 1.5 | 13.3 ± 3.33 | 1.39 | 1,12 | 0.261 |
| Veg. height within 2 m of burrow (cm) | 17.6 ± 3.0 | 25.8 ± 3.5 | 3.12 | 1,12 | 0.103 |

Table 5. Age at initiation of post-fledging dispersal movements and distance traveled by radio-tagged juveniles ($N$ = 15) in 6 families of burrowing owls in southwestern Idaho in 1994.

| Family | Number of Juveniles | Dispersal Age[a,b] ($\bar{x} \pm SE$) | Dispersal Age[b] Range (days) | Mean Dispersal Date | Dispersal Date Range | Max. Known Distance[c] (m) ($\bar{x} \pm SE$) |
|---|---|---|---|---|---|---|
| Dairy #2[d] | 2 | 125.0 ± 9.0 | 116-134 | 23 Sept. | 14 Sept. - 2 Oct. | 208.5 ± 1.5 |
| Dairy #3 | 3 | 69.7 ± 0.9 | 68-71 | 15 Aug. | 11-17 Aug. | 666.7 ± 167.7 |
| Kuna Butte #2 | 4 | 89.3 ± 7.2 | 77-110 | 18 Aug. | 6 Aug. - 8 Sept. | 841.8 ± 258.7 |
| Kuna Butte #3[d] | 1 | 116.0 ± 0.00 | 116 | 18 Sept. | 18 Sept. | 195.0 |
| Kuna Butte #6 | 2 | 70.5 ± 3.5 | 67-74 | 22 July | 20-24 July | 3000.0 ± 0.00 |
| Swan Falls #1 | 3 | 58.0 ± 0.00 | 58 | 22 July | 22 July | 3643 ± 2522.5 |
| All Families | 15 | 88.1 ± 11.1 | 58-134 | 19 Aug. | 20 July - 2 Oct. | 1425.9 ± 614.0 |

[a] A juvenile was considered to have dispersed when it made a permanent movement >300 m away from its natal burrow.
[b] The number of days post-hatching estimated by morphological characteristics at the time of capture.
[c] The farthest distance a juvenile was observed away from its natal burrrow (during the day-time) prior to fall migration.
[d] These 2 families were provided with supplemental food (dead chicks and mice) throughout the breeding season (May - Sept.).

Table 6. Comparison of the timing and distance of post-fledging dispersal movements made by juvenile burrowing owls with and without access to supplemental food (mice and day-old chickens) during the breeding season.

| Treatment | *N* | Dispersal Age[a,b] ($\bar{x} \pm SE$) | Dispersal Age[b] Range (days) | Mean Dispersal Date | Dispersal Date Range | Maximum Distance[c] (m) ($\bar{x} \pm SE$) |
|---|---|---|---|---|---|---|
| Access to supplemental food | 3 | 120.5 ± 4.5 | 116-134 | 20 Sept. | 14 Sept. - 2 Oct. | 201.8 ± 6.8 |
| No access to supplemental food | 12 | 71.8 ± 6.5 | 58-110 | 3 Aug. | 20 July - 8 Sept. | 2037.9 ± 753.6 |

[a] A juvenile was considered to have dispersed when it made a permanent movement >300 m away from its natal burrow.
[b] The number of days post-hatching estimated by morphological characteristics at the time of capture.
[c] The farthest distance a juvenile was observed away from its natal burrrow (during the day-time) prior to fall migration.

Table 7. Timing of final sighting and presumed fates of 15 radio-tagged juvenile burrowing owls during fall 1994.

| Family | Owl # | Final Sighting | Presumed Fate |
|---|---|---|---|
| Dairy #2 | 33 | 2 October | Migrated |
| | 34 | 14 September | Migrated |
| Dairy #3 | 61 | 14 September | Migrated |
| | 64 | 15 September | Migrated |
| | 66 | 12 September | Migrated |
| Kuna Butte #2 | 31 | 8 September | Migrated |
| | 32 | 5 September | Dead |
| | 46 | 21 August | Unknown |
| Kuna Butte #3 | 38 | 18 September | Migrated |
| Kuna Butted #6 | 21 | 24 July | Unknown |
| | 22 | 20 July | Unknown |
| Swan Falls #1 | 60 | 17 August | Unknown |
| | 62 | 17 August | Dead (shot) |
| | 65 | 12 September | Migrated |